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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/568,420

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EXAMINER

CULLEN, SEAN P

ART UNIT

PAPER NUMBER

1725

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DELIVERY MODE

11/03/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/568,420	Applicant(s) INOUE ET AL.	
	Examiner Sean P. Cullen, Ph.D.	Art Unit 1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 September 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>08/16/2010</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosoya et al. (U.S. 2002/0124386 A1) in view of Yoshino et al. (U.S. 5,631,100 A) as evidenced by Johnson et al. (U.S. 5,601,951 A).

Regarding claim 1, Hosoya et al. discloses a non-aqueous electrolyte battery comprising:

- a positive electrode (see cathode, [0175])
- a negative electrode (see anode, [0176]), and
- a non-aqueous electrolyte (see electrolytic solution, [0174]),
- the positive electrode (see cathode, [0175]) having
 - a positive electrode active material-containing layer (see cathode coating film, [0175]) formed on a positive electrode current collector (see aluminum foil, [0175]) and containing
 - an olivine-type lithium phosphate as a positive electrode active material (see LiFePO_4 , [0175]),
 - characterized in that the positive electrode current collector (see aluminum foil, [0175]) has a thickness of less than 20 μm (see 20 μm , [0175]), and

- wherein the positive electrode active material containing layer (see cathode coating film, [0175]) contains a conductive agent (see acetylene black, [0175]),
- the conductive agent has a BET specific surface area of $15 \text{ m}^2/\text{g}$ or greater (see acetylene black, [0175]), and

Hosoya et al. does not explicitly disclose:

- a surface of the positive electrode current collector that is in contact with the positive electrode active material-containing layer has a mean surface roughness R_a of greater than $0.026 \text{ }\mu\text{m}$.

Yoshino et al. discloses a non-aqueous electrolyte battery (Fig. 1) wherein a surface of the positive electrode current collector that is in contact with the positive electrode active material-containing layer has a mean surface roughness R_a of greater than $0.026 \text{ }\mu\text{m}$ (C5/L26-32) to increase the adherence between the coating composition and the metallic foil and improve the high temperature characteristics of the secondary battery (C5/L26-32). Hosoya et al. and Yoshino et al. are analogous art because they are directed to non-aqueous electrolyte batteries. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the non-aqueous electrolyte battery of Hosoya et al. with the surface roughness of Yoshino et al. to increase the adherence between the coating composition and the metallic foil and improve the high temperature characteristics of the secondary battery.

Regarding the claim limitations that the conductive agent has a BET specific surface area of $15 \text{ m}^2/\text{g}$ or greater, Hosoya et al. does not explicitly disclose the BET

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specific surface area of acetylene black. Johnson et al. discloses that acetylene black has a BET specific surface area of between 60 and 70 m²/g (C1/L18-35). Therefore, the conductive agent of Hosoya et al. (see acetylene black, [0175]) inherently possesses a BET specific surface area of 15 m²/g or greater as evidenced by Johnson et al.

Regarding the claim limitation that the positive electrode current collector has a thickness of less than 20 µm, a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. Therefore, one skilled in the art would have expected a positive current collector of 20 µm to have the same properties as a positive current collector of less than 20 µm (i.e., 19.99 µm).

Regarding claim 2, modified Hosoya et al. discloses all claim limitations set forth above and further discloses a non-aqueous electrolyte battery:

- wherein the olivine-type lithium phosphate is lithium iron phosphate (see LiFePO₄, [0175]).

Regarding claims 3 and 4, modified Hosoya et al. discloses all claim limitations set forth above, but does not explicitly disclose a non-aqueous electrolyte battery:

- wherein the positive electrode current collector is an aluminum foil subjected to a roughened process and has a mean surface roughness Ra of less than 0.20 µm.

Yoshino et al. discloses a non-aqueous electrolyte battery (Fig. 1) wherein a surface of the positive electrode current collector that is in contact with the positive

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electrode active material-containing layer has a mean surface roughness Ra of greater than 0.1 μm to 0.9 μm (C5/L26-32) to increase the adherence between the coating composition and the metallic foil and improve the high temperature characteristics of the secondary battery (C5/L26-32). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to have selected the overlapping portion of the ranges disclosed by the reference because selection of overlapping portion of ranges has been held to be a prima facie case of obviousness. *In re Malagari*, 182 USPQ 549.

Regarding limitations recited in claims 5 and 6, which are directed to method of making a roughened current collector it is noted that said limitations are not given patentable weight in the product claims. Even though a product-by-process is defined by the process steps by which the product is made, determination of patentability is based on the product itself and does not depend on its method of production. *In re Thorpe*, 777 F.2d 695, 227 USPQ 964 (Fed. Cir. 1985). Therefore, since the non-aqueous electrolyte battery as recited in claims 5 and 6 is the same as the non-aqueous electrolyte battery disclosed by modified Hosoya et al., as set forth above, the claim is unpatentable even though the non-aqueous electrolyte battery of modified Hosoya et al. was made by a different process. *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983).

Regarding claim 7, modified Hosoya et al. discloses all claim limitations set forth above and further discloses a non-aqueous electrolyte battery:

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- wherein the lithium iron phosphate has an average particle size of 10 μm or less (see 3.1 μm , [0055]).

Regarding claims 8-10, modified Hosoya et al. discloses all claim limitations set forth above and further discloses a non-aqueous electrolyte battery:

- wherein the positive electrode active material-containing layer has a filling density of 1.7 g/cm^3 or greater (see press density, Table A-3).

Regarding claim 11 and 12, modified Hosoya et al. discloses all claim limitations set forth above and further discloses a non-aqueous electrolyte battery:

- wherein the positive electrode active material-containing layer has a filling density of 3.15 g/cm^3 or less (see press density, Table A-3).

Regarding claim 13, modified Hosoya et al. discloses all claim limitations set forth above and further discloses a non-aqueous electrolyte battery:

- wherein carbon is superficially coated on, or adhered to, the positive electrode active material particles (see LiFePO_4 carbon composite material, [0044]).

Regarding claim 14, modified Hosoya et al. discloses all claim limitations set forth above and further discloses a non-aqueous electrolyte battery:

- wherein a portion of lithium sites in the positive electrode active material is substituted by a transition metal (see LiFePO_4 , abstract).

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3. Claims 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hosoya et al. (U.S. 2002/0124386 A1) as evidenced by Johnson et al. (U.S. 5,601,951 A).

Regarding claim 15, Hosoya et al. discloses a non-aqueous electrolyte battery comprising:

- a positive electrode (see cathode, [0175])
- a negative electrode (see anode, [0176]), and
- a non-aqueous electrolyte (see electrolytic solution, [0174]),
- the positive electrode (see cathode, [0175]) having
 - a positive electrode active material-containing layer (see cathode coating film, [0175]) formed on a positive electrode current collector (see aluminum foil, [0175]) and contains
 - an olivine-type lithium phosphate as a positive electrode active material (see LiFePO_4 , [0175]) and
 - a conductive agent (see acetylene black, [0175]),
- the negative electrode (see anode, [0176]) containing
 - a negative electrode (see graphite powders, [0176]) capable of intercalating and deintercalating lithium (see graphite, [0176])
- characterized in that the conductive agent has a BET specific surface area of $15 \text{ m}^2/\text{g}$ or greater (see acetylene black, [0175]), and
- the positive electrode active material-containing layer has a filling density of $1.7 \text{ g}/\text{cm}^3$ or greater (see press density, Table A-3).

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Regarding the claim limitations that the conductive agent has a BET specific surface area of $15 \text{ m}^2/\text{g}$ or greater, Hosoya et al. does not explicitly disclose the BET specific surface area of acetylene black. Johnson et al. discloses that acetylene black has a BET specific surface area of between 60 and $70 \text{ m}^2/\text{g}$ (C1/L18-35). Therefore, the conductive agent of Hosoya et al. (see acetylene black, [0175]) inherently possesses a BET specific surface area of $15 \text{ m}^2/\text{g}$ or greater as evidenced by Johnson et al.

Regarding claim 16, Hosoya et al. discloses all claim limitations set forth above and further discloses a non-aqueous electrolyte battery comprising:

- wherein the olivine-type lithium phosphate is lithium iron phosphate (see LiFePO_4 , [0175]).

Regarding claims 17 and 18, Hosoya et al. discloses all claim limitations set forth above and further discloses a non-aqueous electrolyte battery comprising:

- wherein the positive electrode active material-containing layer has a filling density of 3.15 g/cm^3 or less (see press density, Table A-3).

Response to Arguments

4. Applicant's arguments filed September 7, 2010 have been fully considered but they are not persuasive.

Regarding applicant's argument that the Examiner states that it is obvious to combine Johnson and Hosoya (page 8, para. 3), Johnson is an evidentiary reference to provide evidence that acetylene black has a BET specific surface area of greater than

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15 m²/g. Hosoya discloses a conductive agent is acetylene black ([0175]). Johnson discloses that acetylene black has a BET specific surface area between 60 and 70 m²/g (C1/L18-35). Therefore, the conductive agent of Hosoya et al. (see acetylene black, [0175]) inherently possesses a BET specific surface area of 15 m²/g or greater as evidenced by Johnson et al.

Regarding applicant's argument that the battery according to Johnson is different from those of Hosoya and Yoshino in that the positive electrode and the negative electrode are formed of carbon, both of which contain no lithium before cell reaction (page 8, para. 4), Johnson is an evidentiary reference to provide evidence that acetylene black has a BET specific surface area of greater than 15 m²/g as detailed above.

Regarding applicant's argument that if the positive electrode of Hosoya were replaced by that of Johnson, the battery of Hosoya would run short of Li and could not work as a battery (page 8, para. 4), the Examiner did not propose replacing the positive electrode of Hosoya with the positive electrode of Johnson. Johnson is an evidentiary reference used to provide evidence that acetylene black has a BET specific surface area of greater than 15 m²/g as detailed above.

Regarding applicant's argument that one of ordinary skill in the art cannot be motivated to combine Hosoya and Johnson (page 8, para. 4), the Examiner does not propose combining Hosoya and Johnson. Johnson is an evidentiary reference used to provide evidence that acetylene black has a BET specific surface area of greater than 15 m²/g as detailed above.

Regarding applicant's argument that Hosoya describes that acetylene black is used as an electrification agent (page 8, para. 4), the electrification agent of Hosoya is equivalent to the conductive agent in the instant claims.

Regarding applicant's argument that Johnson describes that acetylene black causes the solvent to be reduced (page 9, para. 1), the Examiner did not propose replacing the positive electrode of Hosoya with the positive electrode of Johnson or combining Hosoya with Johnson. Johnson is merely used as an evidentiary reference to provide evidence that the acetylene black of Hosoya inherently possesses a BET specific surface area of greater than $15 \text{ m}^2/\text{g}$ as detailed above. "Products of identical chemical composition can not have mutually exclusive properties." A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present. In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Hosoya et al. discloses acetylene black and Johnson et al. discloses that acetylene black has a BET specific surface area greater than $15 \text{ m}^2/\text{g}$. Therefore, Hosoya et al. inherently discloses a conductive agent having a BET specific surface area greater than $15 \text{ m}^2/\text{g}$.

Regarding applicant's argument that there is no reason why one of ordinary skill in the art would be motivated to use acetylene black, which has a BET of $60\text{-}70 \text{ m}^2/\text{g}$ that is ideal for causing the solvent to be reduced, as an electrification agent of Hosoya (page 9, para. 1), Johnson is an evidentiary reference to provide evidence that

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acetylene black of Hosoya inherently has a BET specific surface area of greater than 15 m²/g as detailed above.

Regarding applicant's that Yoshino teaches that LiCoO₂ or the like can be used as a positive electrode active material (page 9, para. 2), Yoshino explicitly states that the positive electrode active material is not limited (C3/L26-27).

Regarding applicant's argument that the mean surface roughness Ra of the surface of the positive electrode current collector takes effect remarkable when a positive electrode active material such as olivine-type lithium phosphate having poor electronic conductivity is used (page 9, para. 2), Yoshino also discloses that the mean surface roughness of the surface of the positive electrode current collector has a remarkable effect (Table 3).

Regarding applicant's argument that it is difficult to expect the effect of the present invention by referring to Yoshino, Yoshino explicitly disclose that the positive electrode active material is not limited and that there is a remarkable effect increasing the surface roughness of the positive electrode active material. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the non-aqueous electrolyte battery of Hosoya et al. with the surface roughness of Yoshino et al. to increase the adherence between the coating composition and the metallic foil and improve the high temperature characteristics of the secondary battery.

Regarding applicant's argument that it is not obvious to combine Hosoya and Yoshino (page 9, para. 2), Yoshino explicitly disclose that the positive electrode active material is not limited and that there is a remarkable effect increasing the surface

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roughness of the positive electrode active material. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the non-aqueous electrolyte battery of Hosoya et al. with the surface roughness of Yoshino et al. to increase the adherence between the coating composition and the metallic foil and improve the high temperature characteristics of the secondary battery.

Regarding applicant's argument that the battery according to Johnson is different from those of Hosoya and Yoshino in that the positive electrode and the negative electrode are formed of carbon, both of which contain no lithium before cell reaction (page 8, para. 4), Johnson is an evidentiary reference to provide evidence that acetylene black has a BET specific surface area of greater than $15 \text{ m}^2/\text{g}$ as detailed above.

Regarding applicant's argument that if the positive electrode of Hosoya were replaced by that of Johnson, the battery of Hosoya would run short of Li and could not work as a battery (page 10, para. 4), the Examiner did not propose replacing the positive electrode of Hosoya with the positive electrode of Johnson. Johnson is an evidentiary reference used to provide evidence that acetylene black has a BET specific surface area of greater than $15 \text{ m}^2/\text{g}$ as detailed above.

Regarding applicant's argument that one of ordinary skill in the art cannot be motivated to combine Hosoya and Johnson (page 10, para. 4), the Examiner does not propose combining Hosoya and Johnson. Johnson is an evidentiary reference used to provide evidence that acetylene black has a BET specific surface area of greater than $15 \text{ m}^2/\text{g}$ as detailed above.

Regarding applicant's argument that Hosoya describes that acetylene black is used as an electrification agent (page 10, para. 4), the electrification agent of Hosoya is equivalent to the conductive agent in the instant claims.

Regarding applicant's argument that Johnson describes that acetylene black causes the solvent to be reduced (page 10, para. 4), the Examiner did not propose replacing the positive electrode of Hosoya with the positive electrode of Johnson or combining Hosoya with Johnson. Johnson is merely used as an evidentiary reference to provide evidence that the acetylene black of Hosoya inherently possesses a BET specific surface area of greater than $15 \text{ m}^2/\text{g}$ as detailed above. "Products of identical chemical composition can not have mutually exclusive properties." A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present. In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Hosoya et al. discloses acetylene black and Johnson et al. discloses that acetylene black has a BET specific surface area greater than $15 \text{ m}^2/\text{g}$. Therefore, Hosoya et al. inherently discloses a conductive agent having a BET specific surface area greater than $15 \text{ m}^2/\text{g}$.

Regarding applicant's argument that there is no reason why one of ordinary skill in the art would be motivated to use acetylene black, which has a BET of $60\text{-}70 \text{ m}^2/\text{g}$ that is ideal for causing the solvent to be reduced, as an electrification agent of Hosoya (page 10, para. 4), Johnson is an evidentiary reference to provide evidence that

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acetylene black of Hosoya inherently has a BET specific surface area of greater than 15 m²/g as detailed above.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sean P. Cullen, Ph.D. whose telephone number is 571-270-1251. The examiner can normally be reached on Monday thru Thursday 6:30 a.m. to 5:00 p.m.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley can be reached on 571-272-1453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. P. C./
Examiner, Art Unit 1725

/Robert Hodge/
Primary Examiner, Art Unit 1729